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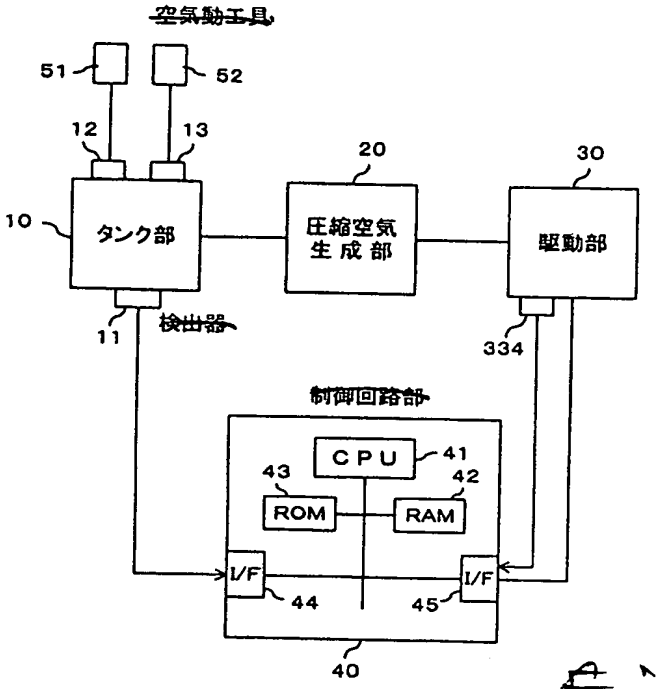
【書類名】　図面

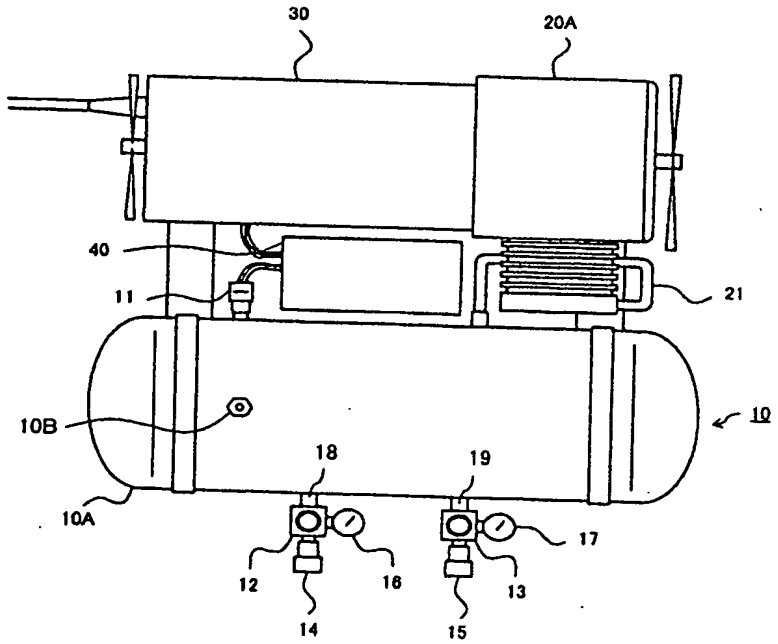
【図１】

Fig. 1



【図２】

Fig. 2



[FIG. 1]

10 ... TANK PORTION

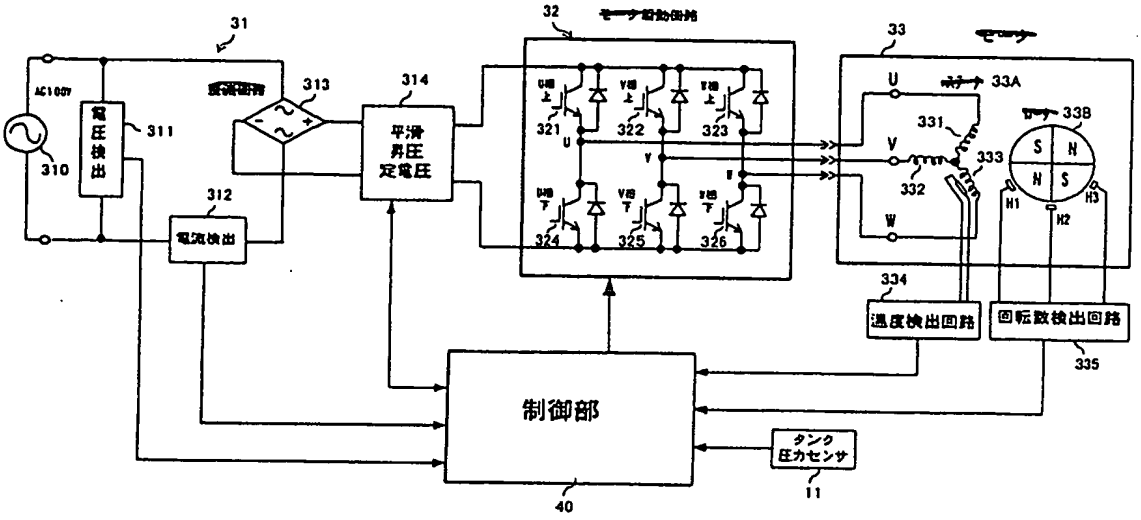
11 ... PRESSURE SENSOR

20 ... COMPRESSED AIR GENERATION PORTION

30 ... DRIVE PORTION

【図３】

Fig. 3


31
32
33
AC100V
310
311
312
313
314
321
322
323
324
325
326
U
V
W
33A
33B
331
332
333
S
N
H1
H2
H3
334
温度検出回路
回転数検出回路
335
制御部
40
タンク
圧力センサ
11

[FIG. 3]

11 ... TANK PRESSURE SENSOR

311 ... VOLTAGE DETECTOR

312 ... CURRENT DETECTOR

314 ... SMOOTHING/BOOSTING/CONSTANT-VOLTAGE CIRCUIT

32 ... MOTOR DRIVE CIRCUIT

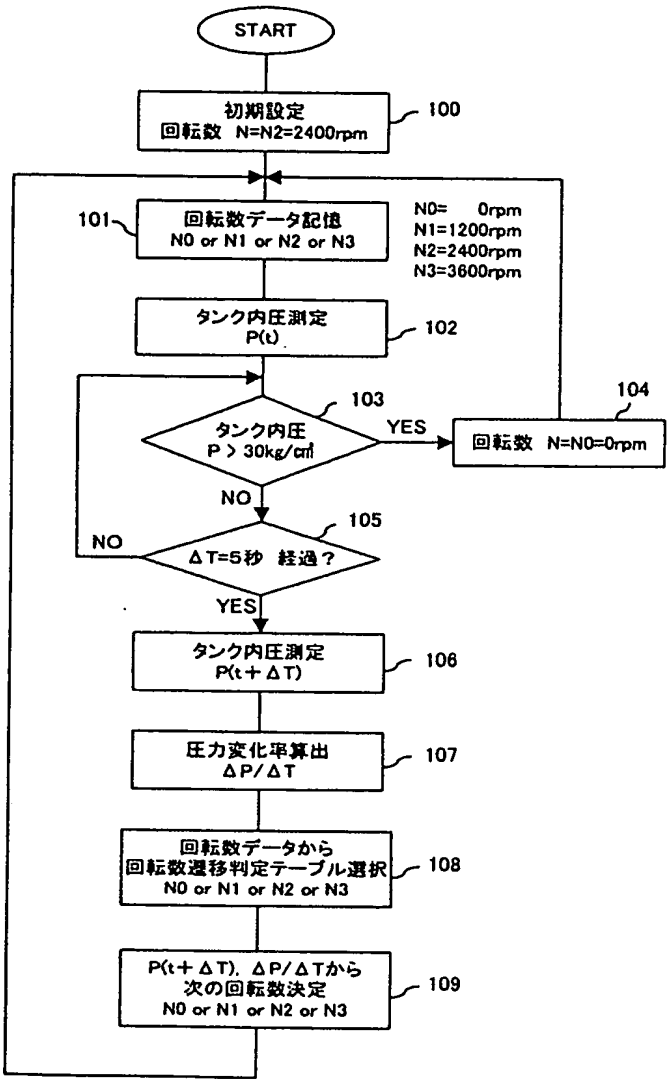
- 321 ... U PHASE (UPPER)
- 322 ... V PHASE (UPPER)
- 323 ... W PHASE (UPPER)
- 324 ... U PHASE (LOWER)
- 325 ... V PHASE (LOWER)
- 326 ... W PHASE (LOWER)

334 ... TEMPERATURE DETECTION CIRCUIT

335 ... ROTATIONAL SPEED DETECTION CIRCUIT

40 ... CONTROL CIRCUIT PORTION

【図4】　Fig. 4


START
初期設定
回転数 N=N2=2400rpm
100
101
回転数データ記憶
N0 or N1 or N2 or N3
N0= 0rpm
N1=1200rpm
N2=2400rpm
N3=3600rpm
タンク内圧測定
P(t)
102
103
タンク内圧
P > 30kg/cm²
YES
104
回転数 N=N0=0rpm
NO
105
NO
ΔT=5秒 経過？
YES
タンク内圧測定
P(t＋ΔT)
106
圧力変化率算出
ΔP/ΔT
107
回転数データから
回転数遷移判定テーブル選択
N0 or N1 or N2 or N3
108
P(t＋ΔT)，ΔP/ΔTから
次の回転数決定
N0 or N1 or N2 or N3
109

[FIG. 4]

100: INITIALIZATION N = N2 = 2400 rpm.

101: STORE ROTATIONAL SPEED DATA N0, N1, N2 OR N3.

102: MEASURE TANK PRESSURE P(t).

103: IS TANK PRESSURE P HIGHER THAN 30 kg/cm^2?

104 N = N0 = 0 rpm.

105: HAS ΔT of 5 sec PASSED?

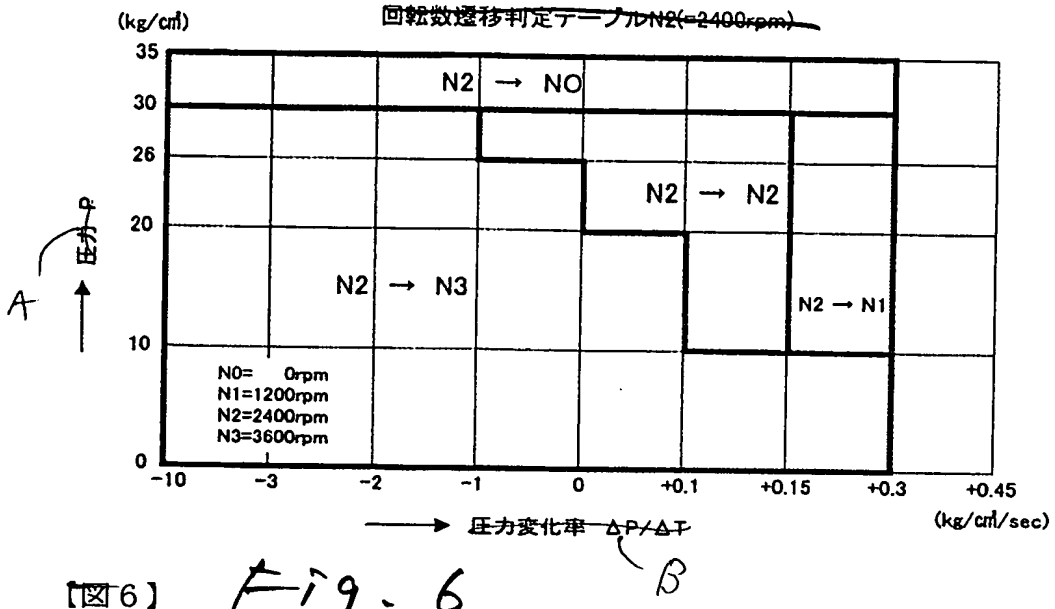
106: MEASURE TANK PRESSURE $P(t+\Delta T)$.

107: CALCULATE RATE $\Delta P/\Delta T$ OF PRESSURE CHANGE.

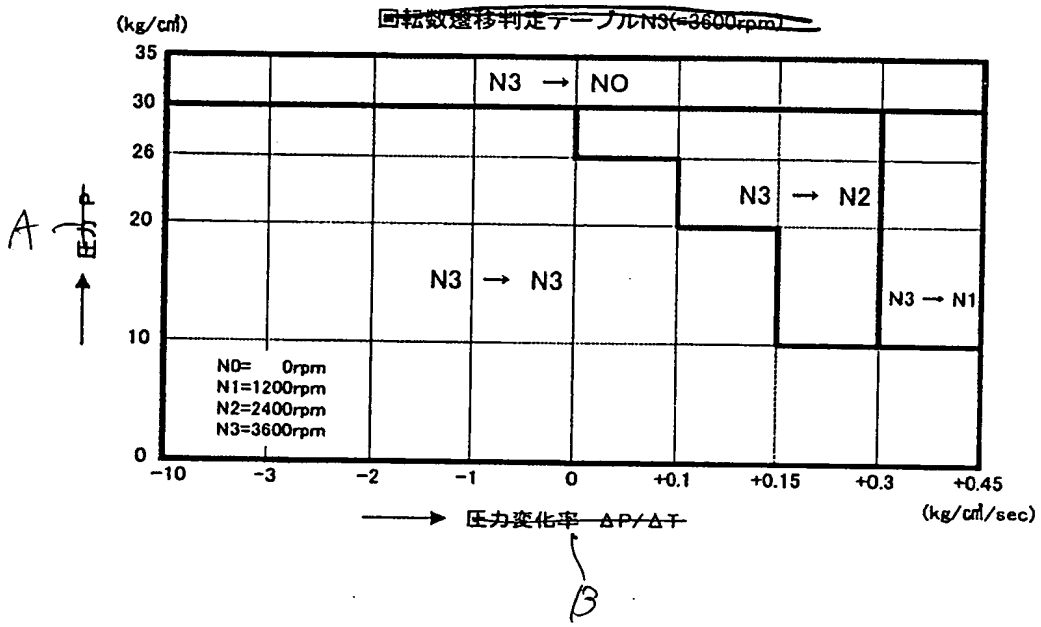
108: SELECT A ROTATIONAL SPEED TRANSITION JUDGMENT TABLE N0, N1, N2 OR N3 ACCORDING TO ROTATIONAL SPEED DATA.

109: DECIDE NEXT ROTATIONAL SPEED ON THE BASIS OF $P(t+\Delta T)$ AND $\Delta P/\Delta T$.

【図5】　Fig. 5



【図6】　Fig. 6



[FIG. 5]

A: PRESSURE P

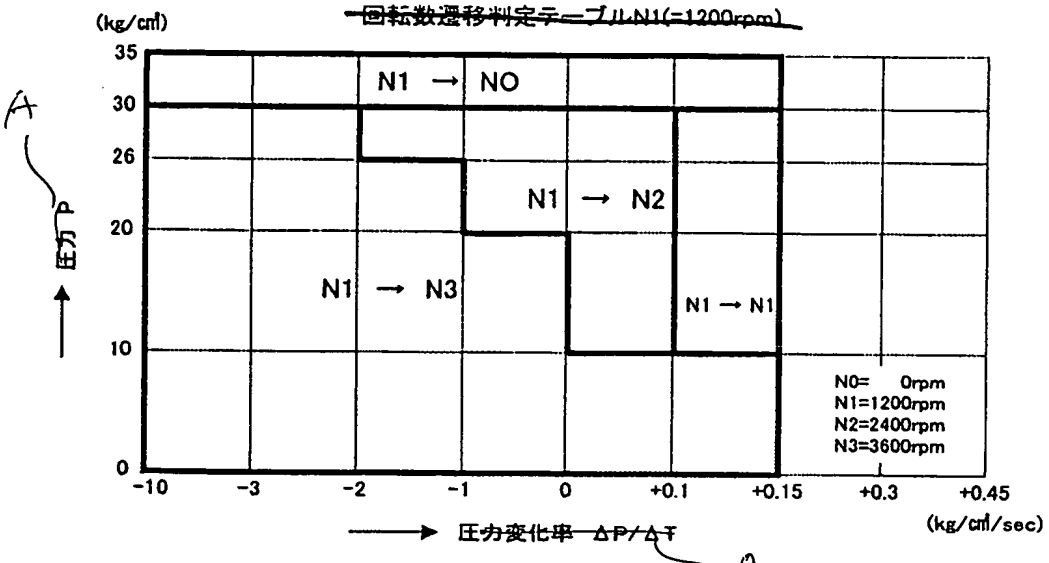
B: PRESSURE CHANGE RATE $\Delta P/\Delta T$

[FIG. 6]

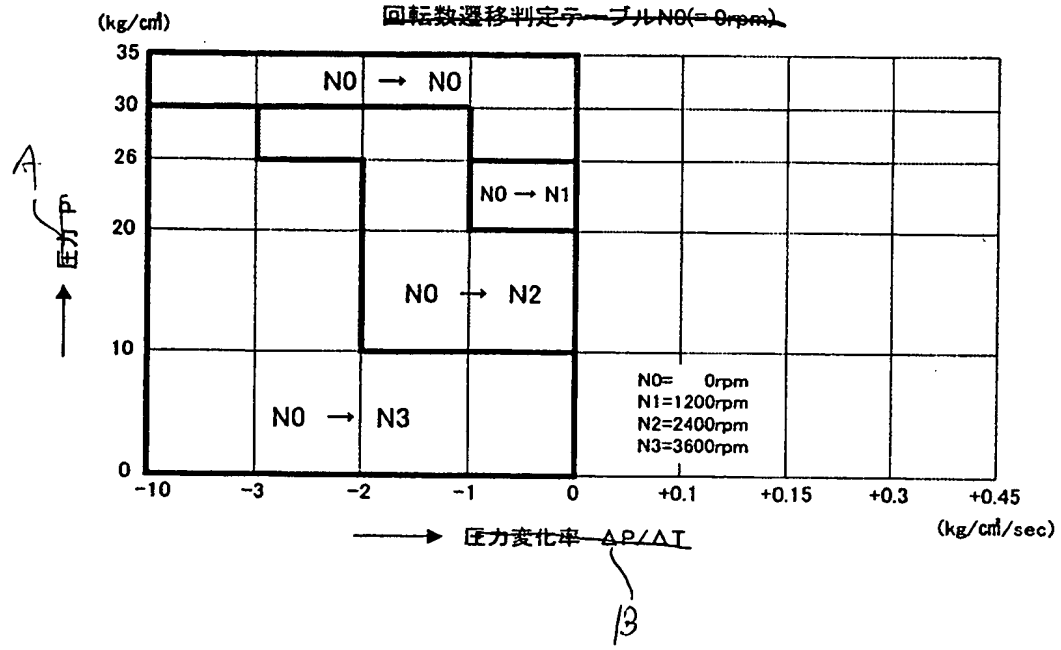
A: PRESSURE P

B: PRESSURE CHANGE RATE $\Delta P/\Delta T$

【図７】 Fig. 7



【図８】 Fig. 8



[FIG. 7]

A: PRESSURE P

B: PRESSURE CHANGE RATE $\Delta P/\Delta T$

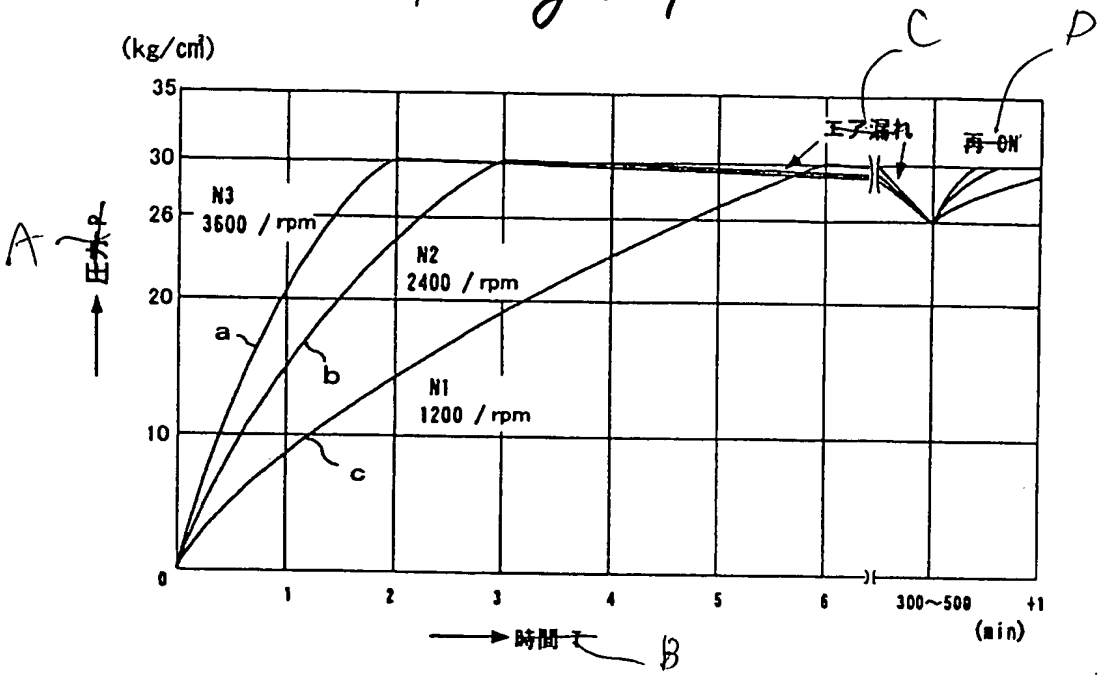
[FIG. 8]

A: PRESSURE P

B: PRESSURE CHANGE RATE $\Delta P/\Delta T$

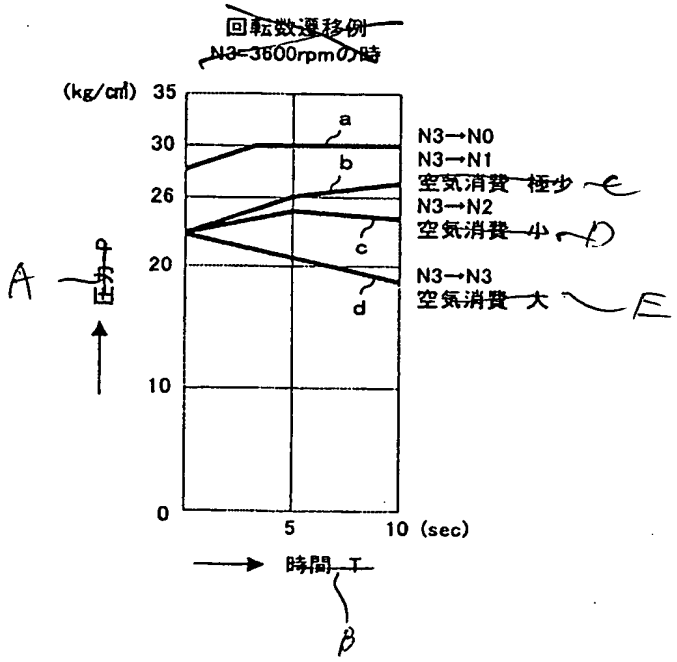
【図９】

Fig. 9



【図１０】

Fig. 10



[FIG. 9]

A: PRESSURE P

B: TIME T

C: AIR LEAKAGE

D: RESTART

[FIG. 10]

A: PRESSURE P

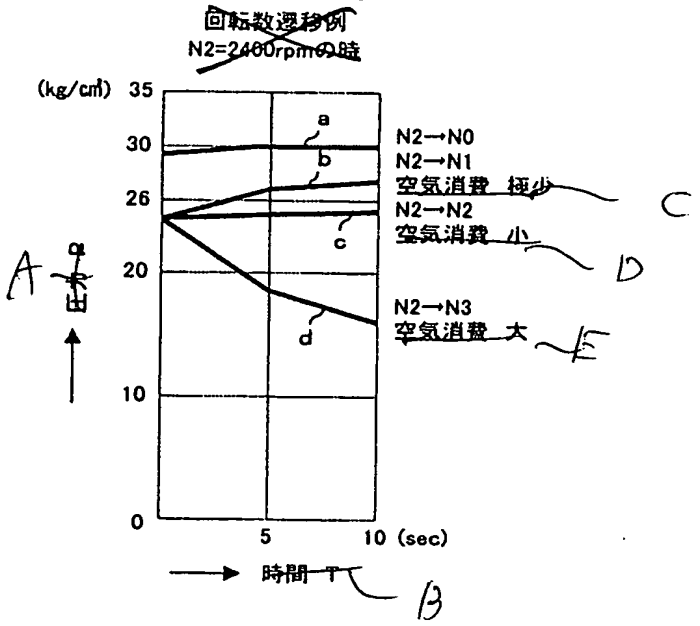
B: TIME T

C: VERY LOW AIR CONSUMPTION

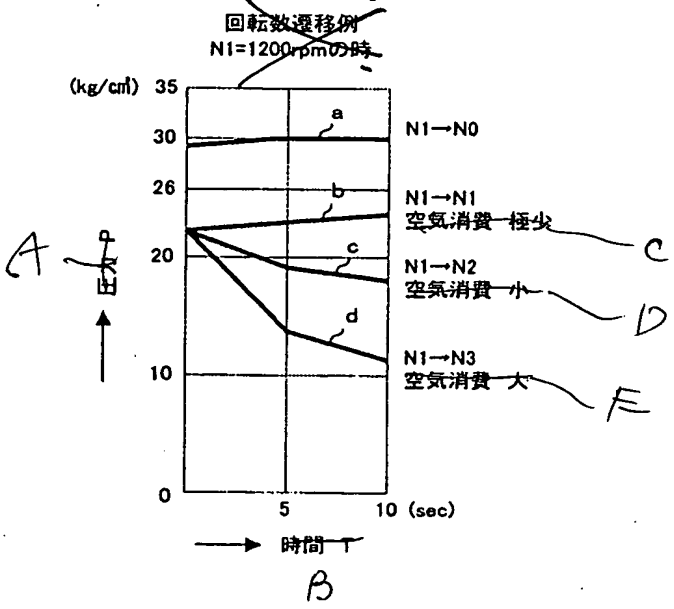
D: LOW AIR CONSUMPTION

E: HIGH AIR CONSUMPTION

【図１１】 Fig. 11



【図１２】 Fig. 12



[FIG. 11]

A: PRESSURE P

B: TIME T

C: VERY LOW AIR CONSUMPTION

D: LOW AIR CONSUMPTION

E: HIGH AIR CONSUMPTION

[FIG. 12]

A: PRESSURE P

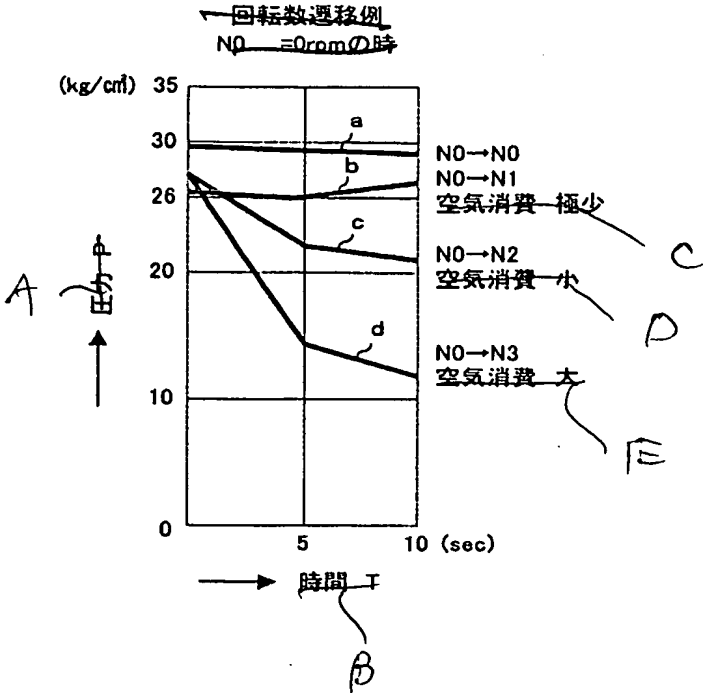
B: TIME T

C: VERY LOW AIR CONSUMPTION

D: LOW AIR CONSUMPTION

E: HIGH AIR CONSUMPTION

【図１３】 Fig. 13


回転数遷移例
N0 =0rpmの時
(kg/cm²)
35
30
26
20
10
0
5
10 (sec)
時間 T
出力 P
a
b
c
d
N0→N0
N0→N1
空気消費 極少
N0→N2
空気消費 小
N0→N3
空気消費 大
A
B
C
D
E

[FIG. 13]

A: PRESSURE P

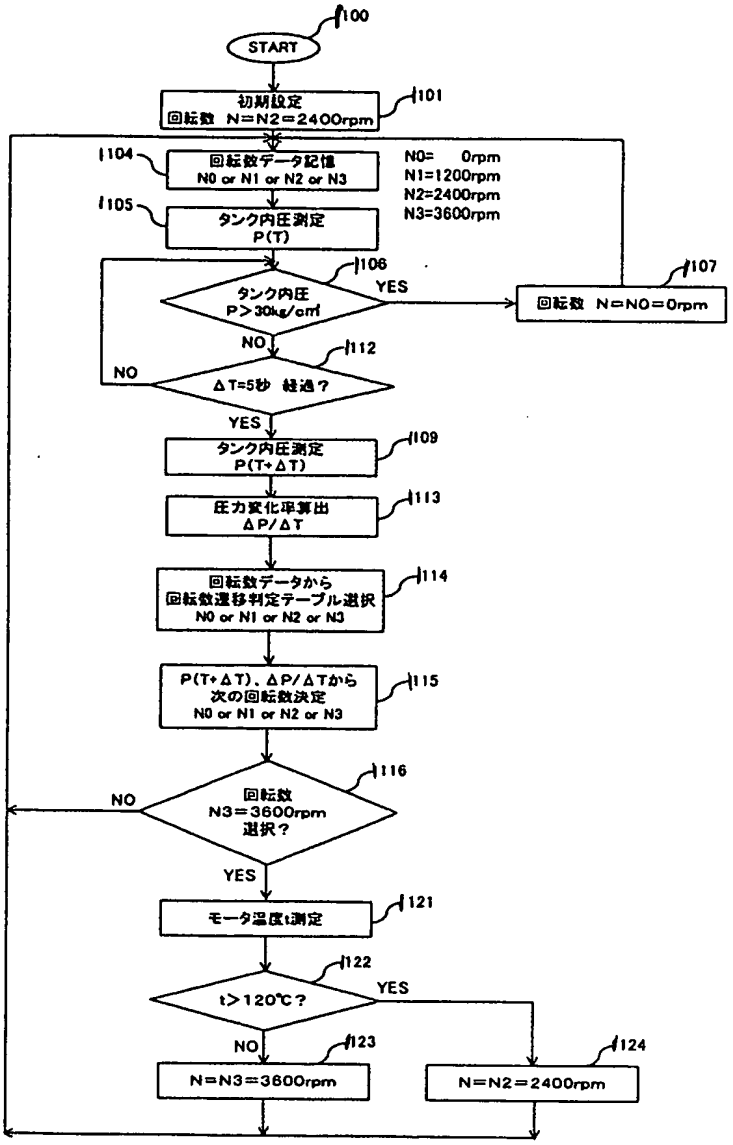
B: TIME T

C: VERY LOW AIR CONSUMPTION

D: LOW AIR CONSUMPTION

E: HIGH AIR CONSUMPTION

【図４】 Fig.14


100
START
101
初期設定
回転数 N=N2=2400rpm
104
回転数データ記憶
N0 or N1 or N2 or N3
N0= 0rpm
N1=1200rpm
N2=2400rpm
N3=3600rpm
105
タンク内圧測定
P(T)
106
タンク内圧
P>30kg/cm²
YES
107
回転数 N=N0=0rpm
NO
112
NO
ΔT=5秒 経過？
YES
109
タンク内圧測定
P(T+ΔT)
113
圧力変化率算出
ΔP/ΔT
114
回転数データから
回転数遷移判定テーブル選択
N0 or N1 or N2 or N3
115
P(T+ΔT)、ΔP/ΔTから
次の回転数決定
N0 or N1 or N2 or N3
116
NO
回転数
N3=3600rpm
選択？
YES
121
モータ温度t測定
122
t>120℃？
YES
NO
123
N=N3=3600rpm
124
N=N2=2400rpm

[FIG. 14]

1101: INITIALIZATION N = N2 = 2400 rpm.

1104: STORE ROTATIONAL SPEED DATA N0, N1, N2 OR N3.

1105: MEASURE TANK PRESSURE P(T).

1106: IS TANK PRESSURE P HIGHER THAN 30 kg/cm^2?

1107: N = N0 = 0 rpm.

1112: HAS ΔT of 5 sec PASSED?

1109: MEASURE TANK PRESSURE $P(T+\Delta T)$.

1113: CALCULATE PRESSURE CHANGE RATE $\Delta P/\Delta T$.

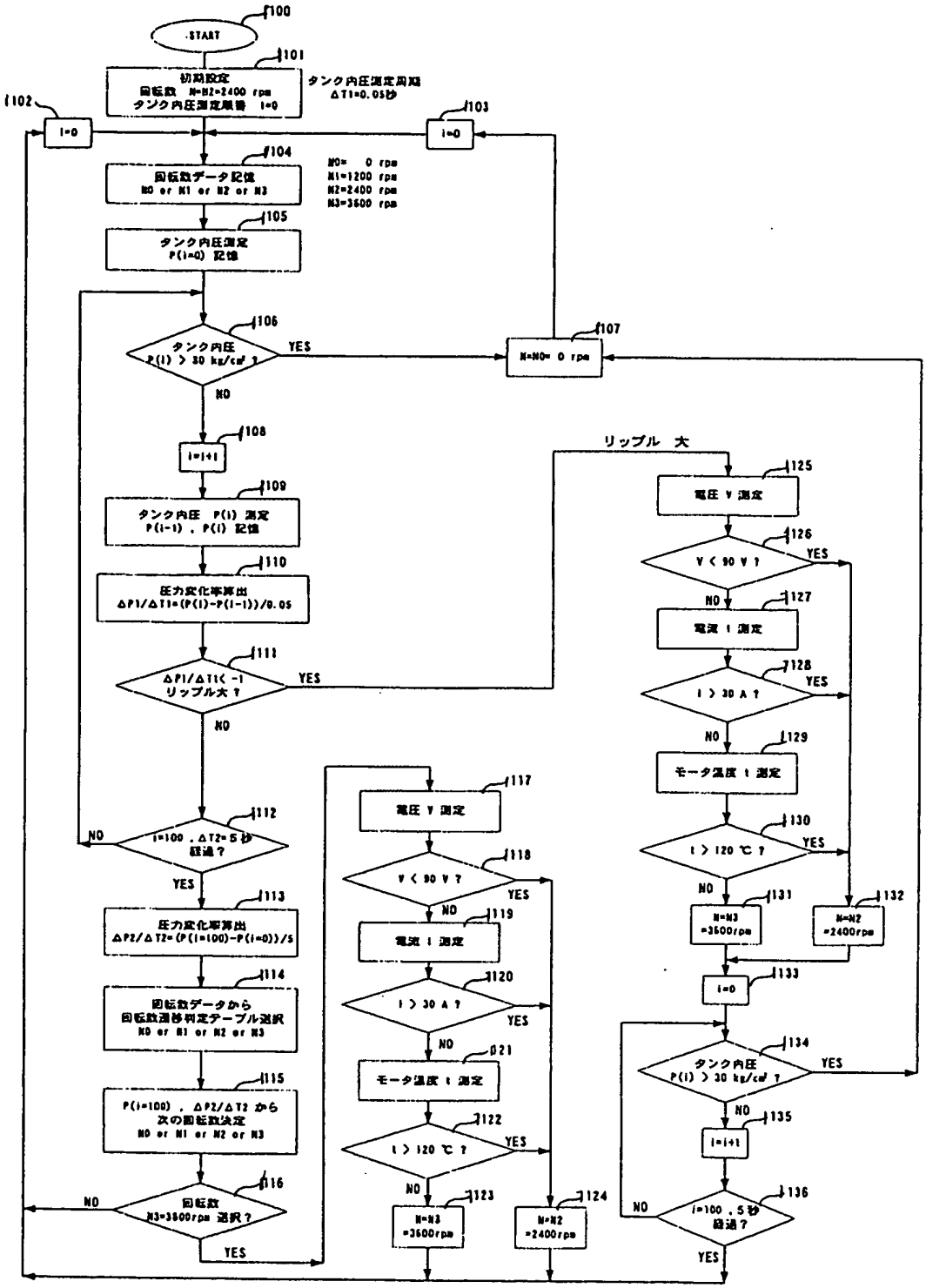
1114: SELECT A ROTATIONAL SPEED TRANSITION JUDGMENT TABLE N0, N1, N2 OR N3 ACCORDING TO ROTATIONAL SPEED DATA.

1115: DECIDE NEXT ROTATIONAL SPEED ON THE BASIS OF $P(T+\Delta T)$ AND $\Delta P/\Delta T$.

1116: IS ROTATIONAL SPEED N3 = 3600 rpm SELECTED?

1121: MEASURE MOTOR TEMPERATURE t.

【図5】 Fig. 15


START
100
初期設定
回転数 N=N2=2400 rpm
タンク内圧測定順番 i=0
タンク内圧測定周期
ΔT1=0.05秒
101
102
i=0
103
i=0
104
回転数データ記憶
N0 or N1 or N2 or N3
N0= 0 rpm
N1=1200 rpm
N2=2400 rpm
N3=3600 rpm
105
タンク内圧測定
P(i=0) 記憶
106
タンク内圧
P(i) > 30 kg/cm² ?
YES
107
N=N0= 0 rpm
NO
108
i=i+1
109
タンク内圧 P(i) 測定
P(i-1) , P(i) 記憶
110
圧力変化率算出
ΔP1/ΔT1=(P(i)-P(i-1))/0.05
111
ΔP1/ΔT1< -1
リップル大 ?
YES
リップル 大
NO
112
i=100 , ΔT2=5秒
経過?
NO
YES
113
圧力変化率算出
ΔP2/ΔT2=(P(i=100)-P(i=0))/5
114
回転数データから
回転数遷移判定テーブル選択
N0 or N1 or N2 or N3
115
P(i=100) , ΔP2/ΔT2 から
次の回転数決定
N0 or N1 or N2 or N3
116
回転数
N3=3600rpm 選択?
NO
YES
117
電圧 V 測定
118
V < 90 V ?
YES
NO
119
電流 I 測定
120
I > 30 A ?
YES
NO
121
モータ温度 t 測定
122
t > 120 ℃ ?
YES
NO
123
N=N3
=3600rpm
124
N=N2
=2400rpm
125
電圧 V 測定
126
V < 90 V ?
YES
NO
127
電流 I 測定
128
I > 30 A ?
YES
NO
129
モータ温度 t 測定
130
t > 120 ℃ ?
YES
NO
131
N=N3
=3600rpm
132
N=N2
=2400rpm
133
i=0
134
タンク内圧
P(i) > 30 kg/cm² ?
YES
NO
135
i=i+1
136
i=100 , 5秒
経過?
NO
YES

[FIG. 15]

1101: INITIALIZATION N = N2 = 2400 rpm AND TANK PRESSURE MEASURING SEQUENCE NUMBER i = 0.

TANK PRESSURE MEASURING CYCLE $\Delta T1 = 0.05$ sec

1104: STORE ROTATIONAL SPEED DATA N0, N1, N2 OR N3.

1105: MEASURE TANK PRESSURE P(i=0).

1106: IS TANK PRESSURE P(i) HIGHER THAN 30 kg/cm^2?

1109: MEASURE TANK PRESSURE P(i) AND STORE P(i-1) AND P(i).

1110: CALCULATE PRESSURE CHANGE RATE $\Delta P1/\Delta T1 = \{P(i) - P(i-1)\}/0.05$.

1111: $\Delta P1/\Delta T1 < -1$? (IS RIPPLE LARGE?)

1112: i = 100? (IS $\Delta T2$ OF 5 sec PASSED?)

1113: CALCULATE PRESSURE CHANGE RATE $\Delta P2/\Delta T2 = \{P(i=100) - P(i=0)\}/5$.

1114: SELECT A ROTATIONAL SPEED TRANSITION JUDGMENT TABLE N0, N1, N2 OR N3 ACCORDING TO ROTATIONAL SPEED DATA.

1115: DECIDE NEXT ROTATIONAL SPEED ON THE BASIS OF P(i=100) AND $\Delta P2/\Delta T2$.

1116: IS ROTATIONAL SPEED N3 = 3600 rpm SELECTED?

1117: MEASURE VOLTAGE E.

1119: MEASURE CURRENT I.

1121: MEASURE MOTOR TEMPERATURE t.

RIPPLE IS LARGE

1125: MEASURE VOLTAGE E.

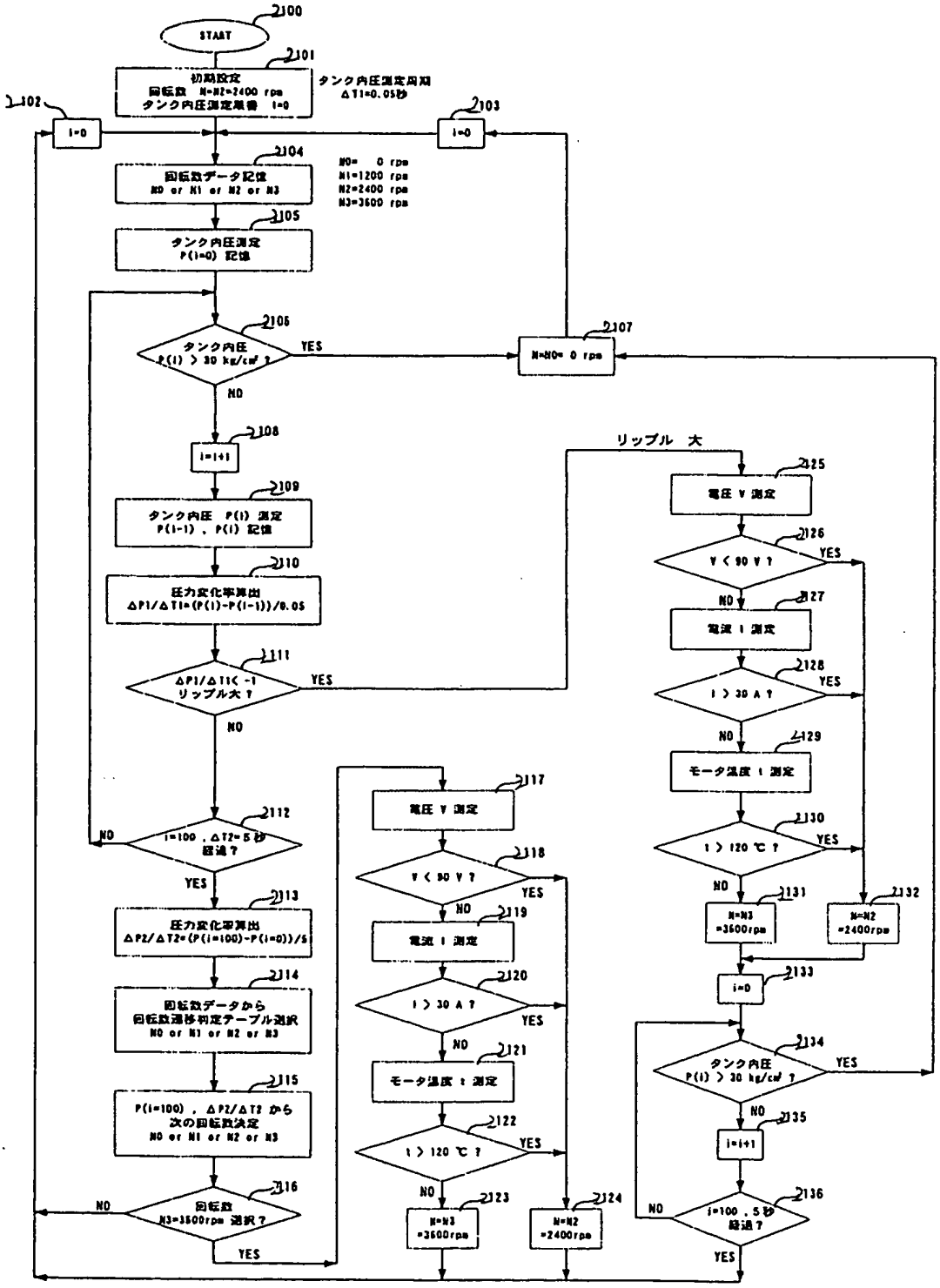
1127: MEASURE CURRENT I.

1129: MEASURE MOTOR TEMPERATURE t.

1134: IS TANK PRESSURE P(i) HIGHER THAN 30 kg/cm^2?

1136: i = 100? (IS THE TIME OF 5 sec PASSED?)

【図4】 Fig. 16


START
初期設定
回転数 N=N2=2400 rpm
タンク内圧測定順番 i=0
タンク内圧測定周期
ΔT1=0.05秒
i=0
i=0
回転数データ記憶
N0 or N1 or N2 or N3
N0= 0 rpm
N1=1200 rpm
N2=2400 rpm
N3=3600 rpm
タンク内圧測定
P(i=0) 記憶
タンク内圧
P(i) > 30 kg/cm² ?
YES
NO
N=N0= 0 rpm
i=i+1
タンク内圧 P(i) 測定
P(i-1) , P(i) 記憶
圧力変化率算出
ΔP1/ΔT1=(P(i)-P(i-1))/0.05
ΔP1/ΔT1< -1
リップル大 ?
YES
NO
リップル 大
電圧 V 測定
V < 90 V ?
YES
NO
電流 I 測定
I > 30 A ?
YES
NO
モータ温度 t 測定
t > 120 ℃ ?
YES
NO
N=N3
=3600rpm
N=N2
=2400rpm
i=0
タンク内圧
P(i) > 30 kg/cm² ?
YES
NO
i=i+1
i=100 , 5秒
経過 ?
YES
NO
i=100 , ΔT2=5秒
経過 ?
NO
YES
圧力変化率算出
ΔP2/ΔT2=(P(i=100)-P(i=0))/5
回転数データから
回転数遷移判定テーブル選択
N0 or N1 or N2 or N3
P(i=100) , ΔP2/ΔT2 から
次の回転数決定
N0 or N1 or N2 or N3
回転数
N3=3600rpm 選択 ?
NO
YES
電圧 V 測定
V < 90 V ?
YES
NO
電流 I 測定
I > 30 A ?
YES
NO
モータ温度 t 測定
t > 120 ℃ ?
YES
NO
N=N3
=3600rpm
N=N2
=2400rpm

[FIG. 16]

2101: INITIALIZATION N = N2 = 2400 rpm AND TANK PRESSURE MEASURING SEQUENCE NUMBER i = 0.

TANK PRESSURE MEASURING CYCLE $\Delta T1 = 0.05$ sec

2104: STORE ROTATIONAL SPEED DATA N0, N1, N2 OR N3.

2105: MEASURE TANK PRESSURE P(i=0) AND STORE P(i=0).

2106: IS TANK PRESSURE P(i) HIGHER THAN 30 kg/cm^2?

2109: MEASURE TANK PRESSURE P(i) AND STORE P(i-1) AND P(i).

2110: CALCULATE PRESSURE CHANGE RATE $\Delta P1/\Delta T1 = \{P(i) - P(i-1)\}/0.05$.

2111: $\Delta P1/\Delta T1 < -1$? (IS RIPPLE LARGE?)

2112: i = 100? (IS $\Delta T2$ OF 5 sec PASSED?)

2113: CALCULATE PRESSURE CHANGE RATE $\Delta P2/\Delta T2 = \{P(i=100) - P(i=0)\}/5$.

2114: SELECT A ROTATIONAL SPEED TRANSITION JUDGMENT TABLE N0, N1, N2 OR N3 ACCORDING TO ROTATIONAL SPEED DATA.

2115: DECIDE NEXT ROTATIONAL SPEED ON THE BASIS OF P(i=100) AND $\Delta P2/\Delta T2$.

2116: IS ROTATIONAL SPEED N3 = 3600 rpm SELECTED?

2117: MEASURE VOLTAGE E.

2119: MEASURE CURRENT I.

2121: MEASURE MOTOR TEMPERATURE t.

RIPPLE IS LARGE

2125: MEASURE VOLTAGE E.

2127: MEASURE CURRENT I.

2129: MEASURE MOTOR TEMPERATURE t.

2134: IS TANK PRESSURE P(i) HIGHER THAN 30 kg/cm^2?

2136: i = 100? (IS THE TIME OF 5 sec PASSED?)

【図５】

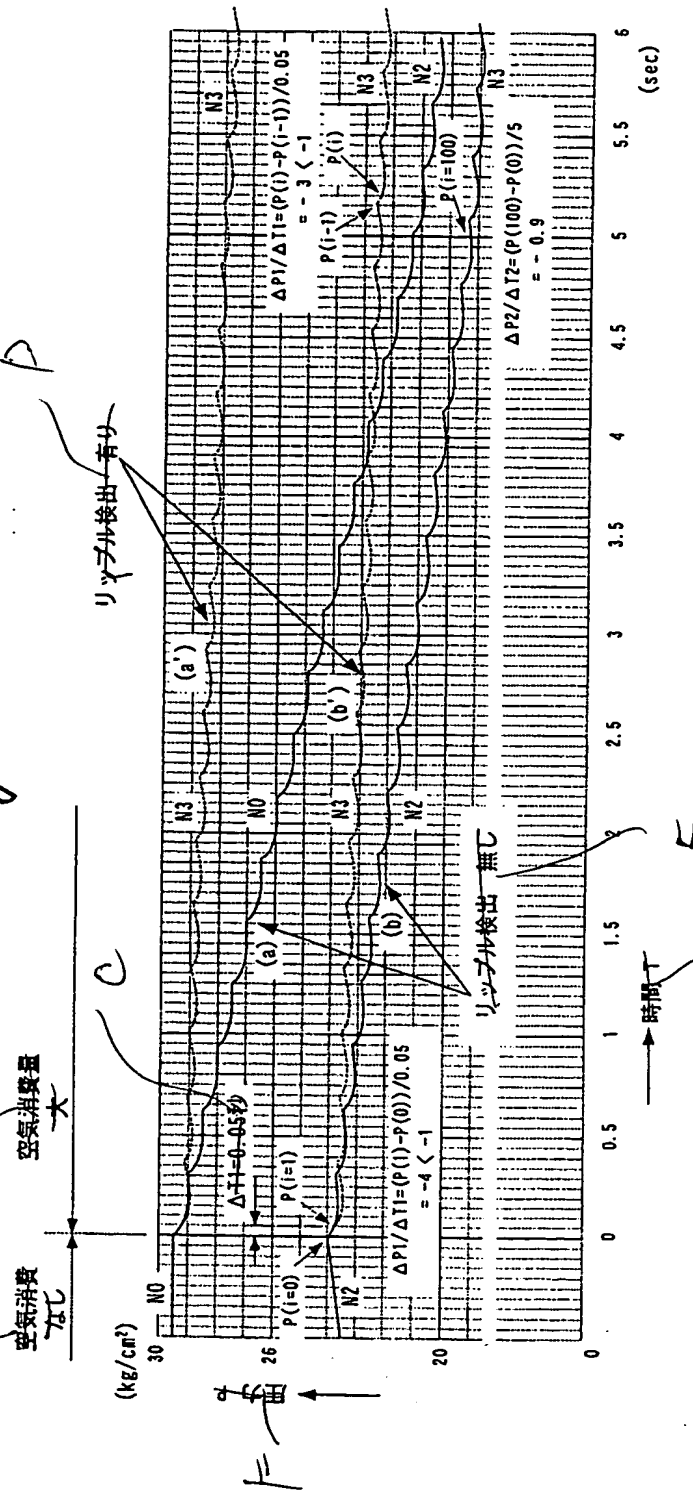

A
B
C
D
E
F
G
空気消費量
大
空気消費量
なし
リップル検出 有り
リップル検出 無し
(a')
(b')
(a)
(b)
N3
N0
N2
ΔT1=0.05秒
P(i=1)
P(i=0)
ΔP1/ΔT1=(P(1)-P(0))/0.05
= -4 < -1
ΔP1/ΔT1=(P(i)-P(i-1))/0.05
= -3 < -1
P(i-1)
P(ii)
P(i=100)
ΔP2/ΔT2=(P(100)-P(0))/5
= -0.9
(kg/cm²)
30
26
20
0
0.5
1
1.5
2.5
3
3.5
4
4.5
5
5.5
6
(sec)
時間T
圧力P

Fig. 17.

[FIG. 17]

A: NO AIR CONSUMPTION

B: HIGH AIR CONSUMPTION

C: $\Delta T1 = 0.05$ sec

D: DETECTED RIPPLES

E: NO DETECTED RIPPLE

F: PRESSURE P

G: TIME T